

# Prevalence of Potentially Malignant Disorders of the Oral Cavity in Bhopal

**Ajay K Pillai, Vikalp Raghuvanshi\*, Siddarth Dubey\*\*, Akshay Kumar Rahmatker, Anumita Sahoo, Dhvani Kawadkar**

Department of Oral and Maxillofacial Surgery, People's Dental Academy, Bhopal, \*Private Consultant, Oral and Maxillofacial Radiologists, Bhopal, \*\*Private Consultant, Oral and Maxillofacial Surgeon, Bhopal

## ABSTRACT

Oral cancer is generally preceded by benign lesions for a varying length of time. Many of them show high potential to become cancers and therefore termed as 'precancerous'. Even though only a small proportion of precancer actually progresses to oral cancer, this development forms a source for over 70% of oral cancers in India. An epidemiological survey was conducted in the population of Bhopal city to estimate the prevalence of potentially malignant disorder of the oral cavity. Our study comprised of a total 2509 samples out of which males were 1354 (54%) and females were 1155 (46%). Out of these, 778 i.e. 31% of the total sample size were habit positive, either chewing tobacco, chewing areca, smoking tobacco, and drinking alcohol or combinations of above. This multi-center cross-sectional study revealed that the deleterious habits in males showed prevalence of 87% and in females showed prevalence of 13%. The ratio of male: female prevalence was determined to be 7:1. This high incidence of PMDOC calls for urgent need to address the issues of tobacco chewing and raise awareness about oral cancer.

**KEY WORDS:** habit index, malignant disorders, oral cavity, white lesions

## INTRODUCTION:

Since time immemorial teeth, mouth and face have been intrinsically fascinating for mankind. They have been and will continue to be the subject of many oral and written beliefs, superstitions, traditions and an object of a wide range of decorative and mutilatory practices. At the same time they have been the cause of considerable sufferings for many. Recorded history is replete with descriptions of methods used by a range of ancient and relatively contemporary cultures to combat the symptoms and effects of disease affecting the teeth and other peri-oral structures<sup>[1]</sup>.

In day-to-day clinical experience, the dental and general medical practitioners often encounter a wide spectrum of oral mucosal lesions. Globally, oral cancer constitutes one of the most common cancers with a very high incidence in the developing countries. In the Indian scenario, oral cancer is the second most

common cancer. It ranges from innocuous mucosal alterations which may need simple therapeutic remedies and patient counselling to lesions of a life-threatening nature<sup>[1]</sup>.

Oral cancer is generally preceded by some benign lesion for a varying length of time. Many of them show a high potential to become cancer and therefore termed as 'precancerous'. Even though only a small proportion of precancer actually progresses to oral cancer, this development forms a source for over 70% of oral cancers in India. Individuals with precancer, run a 69 times higher risk to develop oral cancer as compared to tobacco users who do not have precancer. The recognition and management of precancer therefore constitutes a vital oral cancer control measure.

In the review article of S. Warnakulasuriya et al in 2007<sup>[3]</sup>, an international working group comprising of specialists in the fields of epidemiology, oral medicine and pathology and molecular biology with a special interest in oral cancer and precancer, met in London in May 2005. They discussed the current concepts, terminology, classifications, natural history, pathology and molecular markers to critically analyze the evolution of knowledge and practice concerning

### Corresponding Author:

**Dr Ajay K Pillai**

Professor and Head,

Department of Oral and Maxillofacial Surgery, People's Dental Academy, Bhopal - 462037

Phone No.: 9893260776

E-mail: drajaypillai@yahoo.co.in



the diagnosis and management of what have been traditionally called as precancerous lesions and conditions of the oral mucosa. The workshop was coordinated by the WHO Collaborating Centre for Oral Cancer and Precancer in the UK. The working Group did not favour subdividing precancer into lesions and conditions and the consensus was of the view to refer all clinical presentations that carry a risk of cancer under the term 'potentially malignant disorders' to reflect their widespread anatomical distribution<sup>[3]</sup>.

Potentially malignant disorders of oral cavity (PMDOC) have shown to be commonly associated with the use of tobacco and areca nut in various forms. The high prevalence of these habits in the regional population of Bhopal needed the proposed study to know the prevalence of PMDOC in this region. This study was planned to increase the awareness about PMDOC among Bhopal population and to help various the authorities in planning preventive care to stop carcinogenesis from PMDOC.

An epidemiological survey was conducted in the population of Bhopal city with purpose (a) to estimate the prevalence of potentially malignant disorders of the oral cavity (b) to identify the prevalence of habits in males and females in the study population; (c) to identify the prevalence of type of potentially malignant disorders in the study population and (d) to find out the association of habit index with the potentially malignant disorders. Cancer registry at Gandhi Medical College, Bhopal suggested that an estimated 6 lakh people use tobacco-in form of cigarettes or gutka or raw tobacco out of nearly 24 lakh plus population of Bhopal. One in four persons consumes tobacco on a regular basis in Bhopal. One in five of pre-cancer diagnosed case is of a teenager in Bhopal, Oral cavity cancer is increasing by 2.5% per year in the city<sup>[3]</sup>.

## MATERIALS AND METHODS:

According to Global Adult Tobacco Survey (GATS 2016-2017)<sup>[4]</sup> in India, 42.4% men, 14.2% women and about 4.0% minors (15–17 years) consumed tobacco. India has 28.6% adults who use tobacco and 3.4% adults who use both smoke and smokeless tobacco<sup>[4]</sup>. They also noted that 19% men and 2% women smoked and 29.6% men and 12.8% women used smokeless tobacco products. According

to GATS 2016-17, in Madhya Pradesh, the percentage of consumption of smoked tobacco was 10.2% and smokeless tobacco was 28.1%. 52.2% of men, 17.3% of women and 34.2% of all adults consume either smoke or smokeless tobacco in Madhya Pradesh<sup>[4]</sup>.

The prevalence of tobacco used by minors aged 15-17 years was found to be 13.1 % in MP. 24.7% of adults were found to be exposed to passive smoke at public place and 38% in offices<sup>[4]</sup>.

The data from Madhya Pradesh voluntary health association has suggested that all the parameters related to tobacco abuse have critically increased (Table 1). This prompted us to go for a multi-cluster sampling procedure to focus on the data related to the deleterious and high risk habits and in turn correlate them with the life style and nutritional parameters. The importance of habit counselling at level one prevention of potentially malignant oral disorders has been well established now. All the data was collected through a structured questionnaire. The ethical committee clearance and consent was obtained from each participant as per the protocol mentioned by ICMR

Multi-cluster sampling was done with the help of public health dentistry and certain camps were organized in collaboration with Lion's Club and Rotary Club. The study also covered the slum areas of Bhopal. At each camp site education against tobacco, betel nut and alcohol abuse was conducted. Many of the engineering colleges were screened and since the students came to such colleges from different districts of Madhya Pradesh, the clustering effect and randomization added to the data.

A total of 2509 patients were screened of which 1354 were males and 1155 were females; of these 778 patients consumed tobacco, betel nut, alcohol etc or any combination of the above mentioned substances. After screening the patients for the various OPMD, they were also assessed for nutritional, chew, alcohol and smoke index. The nutritional index was based on BMI and each deleterious habit was denoted as 'chew index, smoke index and alcohol index'. The habit index was defined for the first time by Bailoor and Nagesh in 2005<sup>[5]</sup> and is a statistically sensitive indicator of the prognosis of an oral premalignant and malignant lesion.

## HABIT INDEX:

It may be used by the dentists to quantify the effect of habit on oral mucosa and general health. For example, if a person smokes 10 cigarettes for the last

**Table 1:** Tobacco use in India and Madhya Pradesh.

	India (%)	Madhya Pradesh (%)
Tobacco users in any form	34.6	39.5
Smokers	14	16.9
Bidi smokers	9.2	13.4
Cigarette smoker	5.9	5.1
Chewable form of tobacco user	25.9	31.4
Persons getting affected by passive smoking on public places	29	40
Persons getting affected by passive smoking in public transport	17.5	34.1
Persons getting affected by passive smoking in offices	29.9	32

15 years, then the **smoke index** will be  $10 * 15 = 150$ .

Alcohol consumption is usually measured in peg per week x number of years, for example if a person consumes 2 pegs of whiskey a day / 14 pegs per week, for ten years then his **alcohol index** will be calculated  $14 * 10 = 140$ .

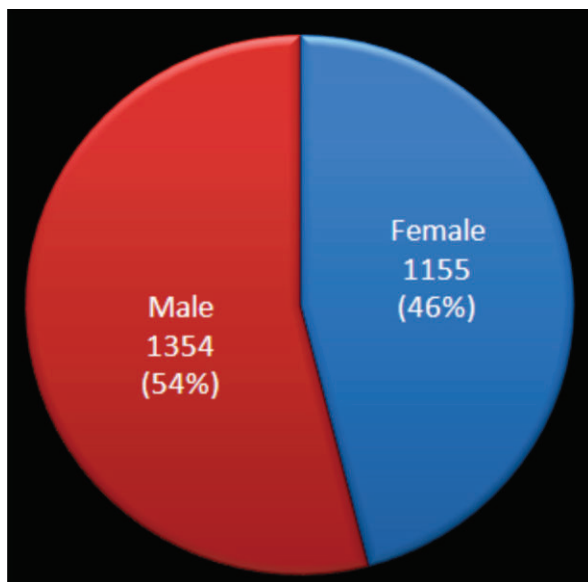
Betel chewing, betel leaf chewing with slaked lime and catechu could also be quantified in similar fashion by a product of the frequency per day X no. of years. At the frequency of 8 a day for twelve years of betel **chew index** would be  $12 * 8 = 96$ .

All the observations and data were tabulated and statistical analysis was performed using the software DECISION ANALYST STAT 2.0™

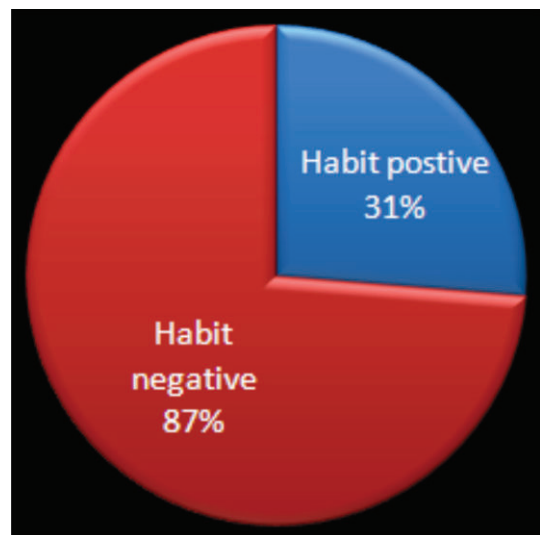
**RESULTS:**

Our study comprised of a total 2509 samples out of which, males were 1354 (54%) and females were 1155 (46%) (Graph1).

**Graph 1:** Gender-wise distribution of screened patients.



**Graph 2:** Habit positive percentage in study population.



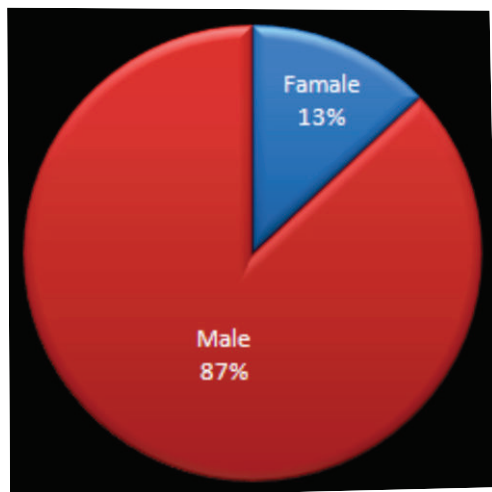
Out of these, 778 i.e. 31% of total sample size (Graph 2) were habit positive, either chewing tobacco, chewing areca, smoking tobacco, and drinking alcohol or combinations of above.

Out of these 778 habit positive cases, the habits were significantly higher in males; males (87%) and females (13%) (Graph 3).

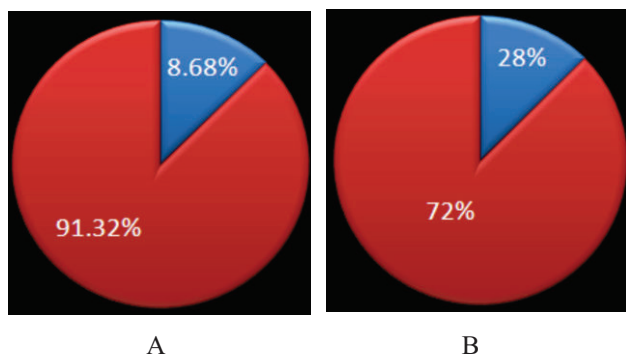
218 cases were having the potentially malignant mucosal disorder which makes the percentage of 8.6% of total screened population and 28% from the habit positive cases (Graph 4).

Potentially malignant disorders of oral cavity in total sample considered were preleukoplakia, lichenoid reaction, leukoplakia, leukoedema, leukokeratosisnicotina palate, Oral Submucous Fibrosis. Percentage of each of the potentially malignant disorder from total screened population was preleukoplakia (0.2%), lichenoid reaction (0.3%), leukoplakia (1.3%), leukoedema (1.5%), leukokera-tosisnicotina palate (1.8%), Oral Submucous Fibrosis (4.74%) (Graph 5).

**Graph 3:** Gender-wise distribution of habit positive cases.



**Graph 4:** Percentage of mucosal disorders in total screened sample (A) and from the habit positive sample (B).



Mucosal lesions were more prevalent in males. Reason may be attributed to the more prevalence of tobacco habits in males. The gender specific percentage of OPMD was: preleukoplakia (M – 0.22%; F – 0.17%), lichenoid reaction (M – 0.5%; F – 0.3%), leukoplakia (M – 2%; F – 0.5%), leukoedema (M – 2.5%; F – 0.4%), Leukokeratosinicotina palate (M – 3%; F – 0.4%), Oral Submucous Fibrosis (M – 7.4%; F – 1.5%) (Graph 6).

Leukoplakia was further divided into its types and its prevalence percentage was as follows: ulcerated (M – 0.14%; F – 0%), verrucous (M – 0.22%; F – 0.17%), speckled (M – 0.5%; F – 0.08%), homogenous (M – 0.88%; F – 0.25%) (Graph 7).

**HABIT INDEX:**

Association of habit index- chew, smoke and alcohol index with the occurrence of potentially malignant disorder was observed. For chew index, the mean habit index was as follows, OSMF - 53.8,

leukoplakia – 41.08, preleukoplakia - 40.4, lichenoid reaction - 32.08, leukoedema – 24.8, Leukokeratosinicotina palate – 22.4 (Graph 8a). For smoke index, the mean habit index was as follows, Leukokeratosinicotina palate – 134.08, leukoplakia – 127.3, leukoedema – 108.7, OSMF – 18.45, preleukoplakia – 16, lichenoid reaction – 12 (Graph 8b). For alcohol index, the mean habit index was as follows, leukokeratosinicotina palate – 104, lichenoid reaction – 84.37, OSMF – 73.4, leukoplakia – 67.3, Preleukoplakia – 53.4, leukoedema – 42 (Graph 8a)

**DISCUSSION:**

In India, tobacco consumption is responsible for half of all the cancers in men and a quarter of all the cancers in women, in addition to being a risk factor for cardiovascular diseases and chronic obstructive pulmonary diseases<sup>[6]</sup>.

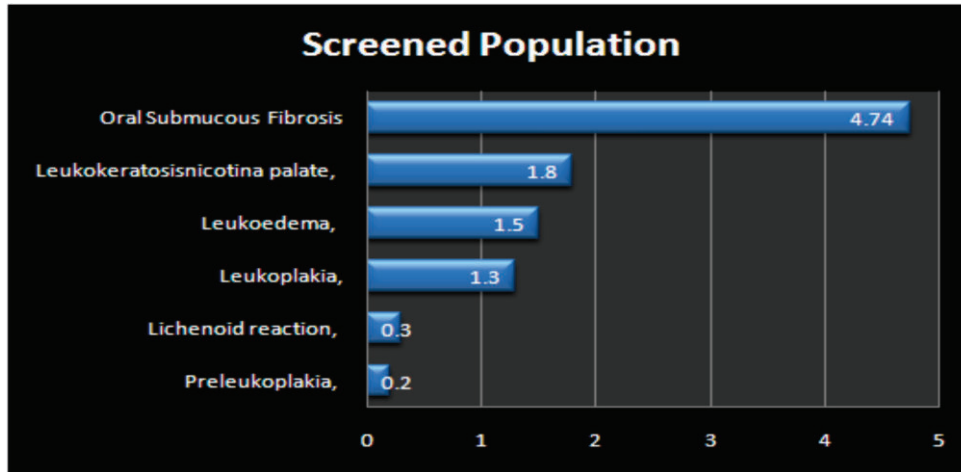
Tobacco is one of the legally available and most commonly used substance that kills one third to half the people who consumes it. As of year 2000, there were an estimated 1.1 billion smokers worldwide and this number is estimated to increase to 1.45 billion in 2020<sup>[6]</sup>. Deaths due to tobacco and other deleterious substances are likely to be more than double between years 1998 and 2030, when there may be more than 8 million deaths annually. This means that tobacco-related deaths will exceed the total number of deaths from malaria, maternal and major childhood conditions, and tuberculosis combined<sup>[6]</sup>.

Certain forms of smoked (*bidis* and *kreteks*) and smokeless (chewing) tobacco are most prevalent in countries of South-East Asia. The World Health Organization predicts that tobacco deaths in India may exceed 1.5 million annually by 2020<sup>[9]</sup>. Tobacco use, a man-made epidemic, kills about 5.4 million people a year globally<sup>[7]</sup>.

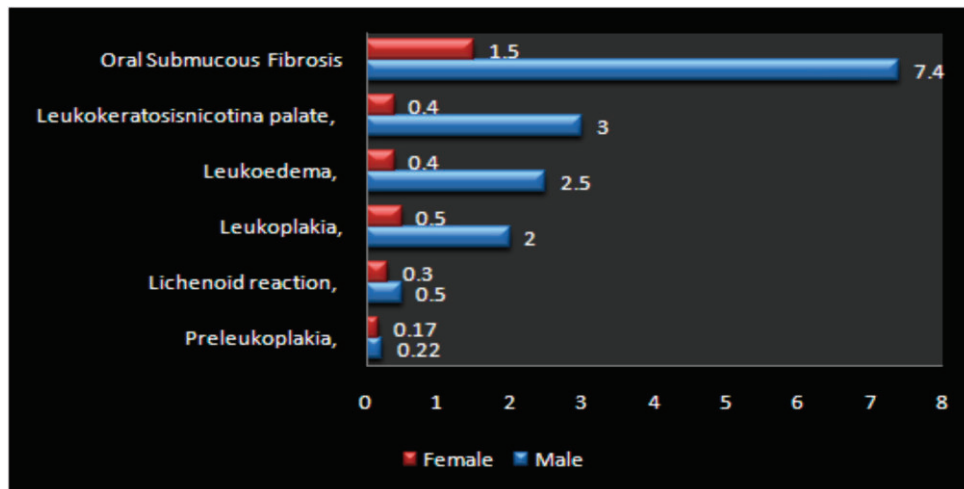
The chewing habit is seen in high school students, labourers and also blue collar workers. This worrisome distribution of habit is a harbinger of the coming epidemic of Oral Cancer. The socio economic status is no longer distinctive or accurate in predicting the use of Ghutka.

Many large-scale cohort studies have been carried out on tobacco users in different states of India right from the 1960s. In urban study areas, among males aged 25–69 years nearly 60% of all those who died were smokers as compared to 39% among controls. Thus, middle-aged smokers had significantly higher death rates than non-smokers from all medical causes combined. The risk of death due to tuberculosis

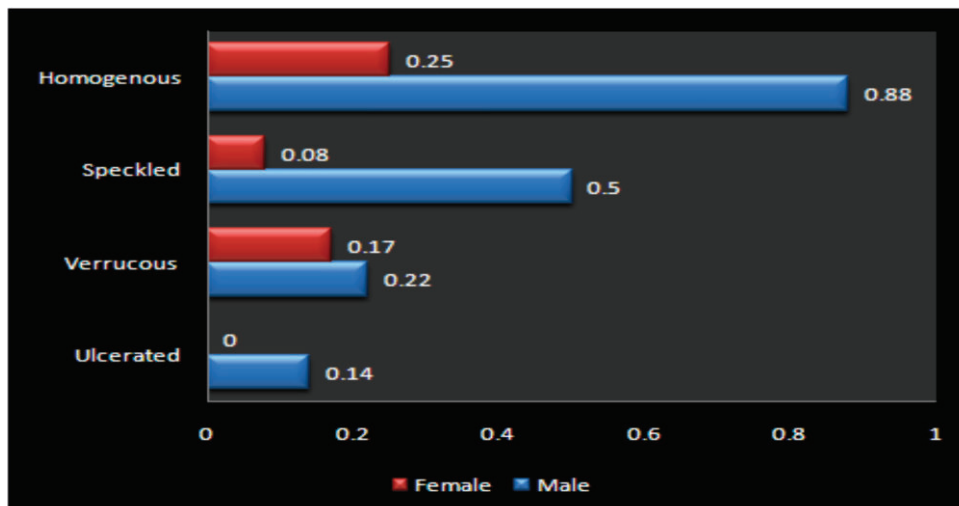
**Graph 5:** Prevalence of oral potentially malignant disorder in total screened population.



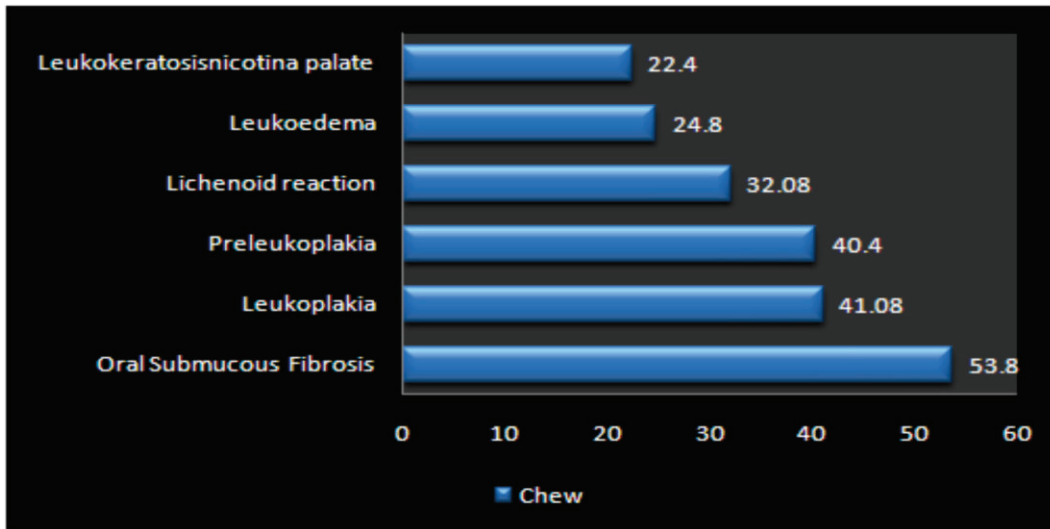
**Graph 6:** Gender specific prevalence of oral potentially malignant disorder in total screened population.



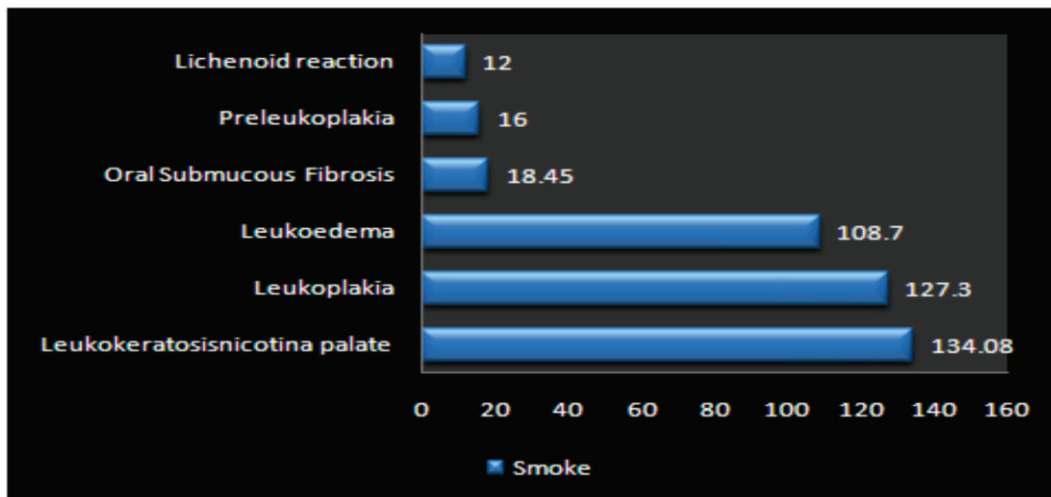
**Graph 7:** Gender specific prevalence of types of leukoplakia in total screened population.



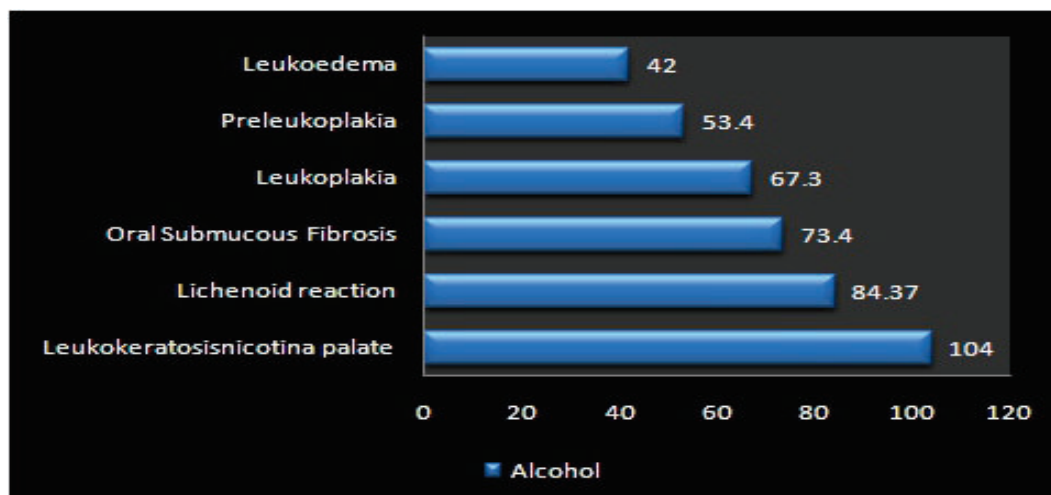
Graph 8a: Mean habit for chew index.



Graph 8b: Mean habit for smoke index.



Graph 8c: Mean habit for alcohol index.



was 6.3 times higher, other respiratory illnesses 3.7 times higher, vascular causes 1.7 times higher and neoplastic causes twice as high among smokers than leukoplakia – 127.3, leukoedema – 108.7, OSMF 18.45, preleukoplakia – 16, lichenoid reaction – 12 (Graph 8b) non-smokers. Similar trends were seen among rural smokers<sup>[10]</sup>.

The prevalence of tobacco consumption in our study was 24% (778/2509); out of which 87% (676) were males and 13% (101) were females. Even though the prevalence was less in females, they have a more risk of malignant transformation<sup>[11]</sup>.

A study conducted by Neufeld and his coworkers<sup>[12]</sup> provides national estimates of regular tobacco and alcohol use in India and its association with gender, age and economic group, obtained from a representative survey of 471,143 people over the age of 10 years in 1995-96, the National Sample Survey. The national prevalence of regular use of smoked tobacco is estimated to be 16.2%, chewing tobacco 14.0% and alcohol 4.5%. Men were 25.5 times more likely than women to report regular smoking, 3.7 times more likely to regularly chew tobacco, and 9.7 times more likely to regularly use alcohol.

Rani M et al<sup>[13]</sup> in 2003 in a cross sectional, nationally representative population based household survey concluded that in 30 % of the population, 15 years or older-47% men and 14% of women-either smoked or chewed tobacco.

Smoking, drinking and chewing have been positively associated with oral lesions such as oral submucous fibrosis (OSF), leukoplakia, lichenoid reaction, smoker's palate which have the potential of malignant transformation.

In our study 218 cases were found positive for OPMD i.e. 8.6% from total population and 28.02% from habit positive cases.

Saraswathi TR et al<sup>[14]</sup> in 2006 in a hospital based study from South India found that oral soft tissue lesions were found in 4.1% of the study subjects. Prashant B. Patil et al<sup>[15]</sup> in 2013 in a hospital based cross-sectional study in South India found that oral mucosal lesions were present in 322 (26.8%) subjects who had tobacco smoking and chewing habits.

In a study conducted in Indore, Madhya Pradesh by Priyanka Mahawaret al<sup>[16]</sup> in 2011, chronic tobacco chewers were screened for oral pre-malignant lesions followed by an educational intervention about the harmful effects of tobacco and found that among 80 identified chronic tobacco chewers, 60 were males and 20 were females. Lesions such as leukoplakia, erythroplakia and oral sub-mucosal fibrosis were found in 10 females (50%) and 24 males (40%).

In our study, the prevalence percentage of each of the potentially malignant disorder from total screened population was preleukoplakia (0.2%) lichenoid reaction (0.3%), leukoplakia (1.3%), leukoedema (1.5%), leukokeratosisnicotina palate (1.8%), Oral Submucous Fibrosis (4.74%)

In a hospital based study from Vidisha(60 kms from Bhopal), Ravi Mehrotra et al 2010<sup>[17]</sup> found that with reference to the habit of tobacco use, 635(21%) were smokers, 1272(42%) tobacco chewers, 341(11%) smokers and chewers, while 1464(48%) neither smoked nor chewed tobacco. 256 patients were found to have significant mucosal lesions. Of these, 216 cases agreed to undergo scalpel biopsy confirmation. 88 had leukoplakia, 21 had oral submucous fibrosis, 9 showed smoker's melanosis and 6 patients had lichen planus, while there was 1 patient with lichenoid reaction.

In a South Indian study by Saraswathi TR et al in 2006<sup>[14]</sup> oral soft tissue lesions were found in 4.1% of the study subjects. In this study, smoker's melanosis was found to be the most common soft tissue lesion with the prevalence being 1.14%. Stomatitis nicotinapalatini (0.89%) and leukoplakia (0.59%) were the second and third most common lesions. Among men, smoker's melanosis and stomatitis nicotinapalatini were more prevalent as compared to other soft tissue lesions, whereas among women leukoplakia and OSMF were more prevalent.

In our study the overall prevalence of leukoplakia was 1.8%from total population and 4.8% among tobacco users. It was less than that reported in a number of epidemiologic studies, like 8.25% reported by Prashant B. Patilet al<sup>[15]</sup> and 11.5% reported by Bhowate et al<sup>[18]</sup>.

Campisi and Margiottaet al<sup>[19]</sup> in their Italian study reported one of the highest incidences (13.8%) of leukoplakia in men who drank alcohol and had the habit of smoking.

Lichenoid reactions had a prevalence of 2.9% among tobacco users and 0.3% among total sample, which is higher as compared to the study by Prashant B. Patil et al 2013<sup>[15]</sup>.

Lichenoid reaction was more prevalent among the cases having combination of tobacco chewing and alcohol. In 2018, in a study in Mahabubnagar, Telengna, authors reviewed a totalnumberof 1453 oral biopsies and found that 62cases were potentially malignant disorders with the most common lesion being luekoplakia<sup>[20]</sup>. Leukoplakia is more common in males and is 6 times more prevalent among smokers<sup>[21]</sup>.

## CONCLUSIONS:

The multi-center cross-sectional study revealed that the deleterious habits in males showed a prevalence of 87% and in females showed a prevalence of 13%. The ratio of male: female prevalence was determined to be 7:1. The commonest oral lesions were determined as per their levels of prevalence as OSMF (4.74%) >Leukokeratosisnicotina palate (1.8%) >leukoedema (1.5%).

The least common in our series was pre-leukoplakia (0.20%). The chewing index showed a POSD of 2.8% for T – value 0.035 indicating it was statistically not significant in OSMF and Leukoplakia statistic. When the chew index was analyzed between leuko-keratosisnicotina palate and OSMF which was highly significant with a T – value 4.48 for POSD of 100%. The smoking index was found to be a sensitive indicator and for a T – value of 0.532 a moderate POSD of 40.34% emerged. The leukokeratosisnicotina palate and lichenoid reaction when compared gave a T – value of 5.569 pointing towards 100% difference in POSD. The alcohol index was a definitive discriminator between leukokeratosisnicotina palate and lichenoid reaction. The T – value being 1.018 and POSD indicating 68.61% which was statistically significant. The leukokeratosisnicotina palate and leukoedema as expected showed a POSD of 100% for a T – value of 6.982.

The prevalence rates of oral lesions show a logically observational relationship to the habit index of chewing, smoking, and alcohol. The role of oral physician in temperance of oral habits and in forcing government policy decisions to protect our youth and school children from bad habits on oral mucosa and general health appears to be a goal which is unsurmountable due to commercial advertising and tax compulsions of the state and central government.

## REFERENCES:

- Daftary DK, Murti PR, Bhonsle RB, Gupta PC, Mehta FS, Pindborg JJ. Oral precancerous lesions and conditions of tropical interest in Oral Diseases in the Tropics, Prabhu SR, Wilson DF, Daftary DR, Johnson NW (Eds.); chapter 36, Oxford University Press, Delhi, 1993: 417-422.
- Mehta F S, Gupta P C, Daftary D K, Pindborg J J, Choksi S K. An epidemiologic study of oral cancer and pre-cancerous conditions among 101 761 villagers in Maharashtra, India. *Ind J Cancer*. 1972, 10: 134-141.
- Warnakulasuriya S, Newell W, Johnson I. van der Waal. Nomenclature and classification of potentially malignant disorders of the oral mucosa. *J Oral Pathol Med*. 2007; 36:575–80.
- GATS Global adult tobacco survey Fact Sheet India 2016–17. *World Health*, 2017; pp.1-4.
- Bailoor DN, KS Nagesh. Fundamentals of oral medicine and radiology. 3rdEdn.: Jaypee Brothers Medical Publishers ltd; 2005. pp1-447.
- World Health Organization. Tobacco or Health : A Global Status Report. 1997;pp495.
- Guindon GE, Bosclair D. Past, current and future trends in tobacco use. Washington DC: The International Bank for Reconstruction and Development/ the World Bank. 2003.
- WHO Report on the Global Tobacco Epidemic, MPOWER package, 2008.pp.1-342.
- Murray C, Lopez JL, Alan D. World Health Organization, World Bank & Harvard School of Public Health and injuries. The Global burden of disease. 1996.
- Gajalakshmi V, Peto R, Kanaka T, Jha P. Smoking and mortality from tuberculosis and other diseases in India: Retrospective study of 43 000 adult male deaths and 35 000 controls. *Lancet*, 2003; 362: 507–15.
- Spieght et al. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2018;125:612–627.
- Neufeld KJ, Peters DH, Rani M, Bonu S, Bronner RK: Regular use of alcohol and tobacco in India and its association with age, gender, and poverty. *Drug Alcohol Depend*. 2005;77(3): 283-91.
- Rani M, Bonu S, Jha P, Nguyen SN, Jamjoum L. Tobacco use in India: prevalence and predictors of smoking and chewing in a national cross sectional household survey. *Tob Control*. 2003;12(4):e4. doi:10.1136/tc.12.4.e4
- Saraswathi TR et al. Prevalence of oral lesions in relation to habits: Cross-sectional study in South India *Ind J Dent Res*. 2006;17(3): 121-125.
- Patil PB, Bathi R, Chaudhari S. Prevalence of oral mucosal lesions in dental patients with tobacco smoking, chewing, and mixed habits: A cross-sectional study in South India. *J Family Community Med*. 2013; 20(2):130–135.
- Mahawar P, Anand S, Sinha U, Bansal M, Dixit S. Screening for pre-malignant conditions in the oral cavity of chronic tobacco chewers. *Nation J Comm Medi*. 2011;2(1):85-85.
- Mehrotra R, Thomas S, Nair P, et al. Prevalence of oral soft tissue lesions in Vidisha. *BMC Res Notes*. 2010;3:23.
- Bhowate RR, Rao SP, Hariharan KK, Chinchkhede DH, Bharambe MS. New Delhi: Allied Publishers Limited; 1994. Oral mucosal lesions among tobacco chewers: A community based study. Preventive section in XVI International Cancer Congress, Abstract Book-1; p. 435.
- Campisi G, Margiotta V. Oral mucosal lesions and risk habits among men in an Italian study population. *J Oral Pathol Med*. 2001; 30:22–8.



20. Manthapuri S, Sanjeev AS. Prevalence of potentially malignant disorders: An institutional study. *Intern J App Dent Scien*. 2018;4(4):101-103.
21. Warnakulasuriya S. Clinical Features and Presentation of Oral Potentially Malignant Disorders. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2018;125:582–590.

Cite this article as: Pillai AJ, Raghuvanshi V, Dubey S, Rahmatker AK, Sahoo A, Kawadkar D. Prevalence of Potentially Malignant Disorders of the Oral Cavity in Bhopal. *PJSR*;2020;13(2):14-22.  
Source of Support : Nil, Conflict of Interest: None declared.